CADD/GIS Bulletin

Information Exchange Bulletin

CADD/GIS Technology Symposium and Exposition 2000, St. Louis, Missouri
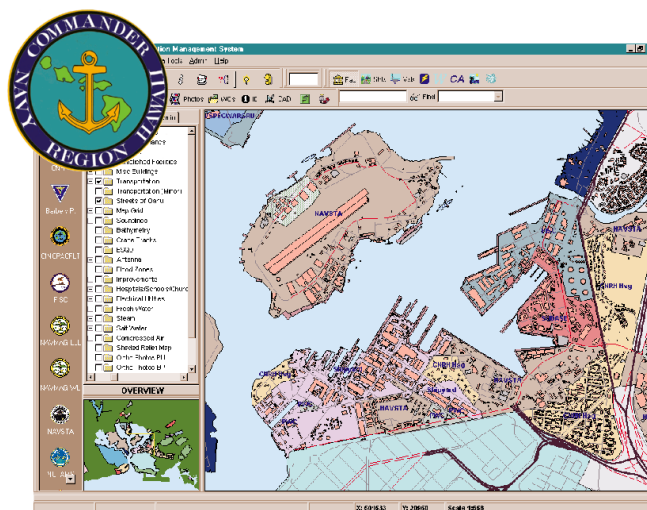
by Toby Wilson, The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment

May 22-25 is the week for the CADD/GIS Technology Center's fourth CADD/GIS Symposium and Exposition. For the year 2000, the Symposium is sponsored by 12 Federal agencies. With over 120 presentations and 100 exhibition booths highlighting the latest technology and achievements in computer-aided design and drafting (CADD), geospatial information systems (GIS), facility management (FM), and including surveying, mapping, and remote sensing, this year's Symposium is guaranteed to surpass all others!

Just a Couple of Highlights!

Commander Naval Forces Japan and Commander Navy Region Hawaii have been active in building shore installation management maps and GIS applications that give the local Commander access to accurate facilities, infrastructure, environmental, and planning information to make better decisions faster.

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Inside this edition . . .

These two initiatives have used both the Naval Facilities Engineer Command (NAVFAC) and the Spatial Data Standards (SDS) for Facilities, Infrastructure, and Environment to assure maximum operability among Navy organizations.

All over the world, local government authorities are working to better manage urban infrastructure, while making the best economic and environmental use of the Earth's resources. Imagery is used to support civil government applications such as local and regional planning, landbase mapping, urban planning, property appraisal and tax assessment, emergency planning and response, and infrastructure management. The most important use of imagery for all these applications is the establishment of a stable, consistent image base map.

Visit our Web site at http://tsc.wes.army.mil for more information and to register. See you under the Arch!

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The IKONOS Satellite
(Photo Credit: Russ Underwood, Lockheed Martin Missiles and Space)

From the Chief

by Harold Smith, Chief, The CADD/GIS Technology Center
for Facilities, Infrastructure, and Environment

A new millennium, new directions, new challenges! As we enter the new century, we in the CADD/GIS Technology Center can reflect with pride on our past accomplishments, but will continue to focus on the opportunities proffered by the future. Over the past few years, the Center has grown from a small, closely knit CADD group to a nationally recognized leader in the development of CADD/GIS standards and productivity enhancement tools.

Within recent years, the Center's achievements have been many. Development of the Center's interactive Web site provides invaluable resources to our customers, in keeping with our mission to advance CADD, GIS, and facilities management (FM) technology applications. Participation in the Center's Electronic Bid Solicitations (EBS) program, winner of the prestigious Vice President's Hammer Award in 1996, continues to increase, and the EBS Web page has become one of the leading sources of information for contractors and printing companies. Many of the participating agencies learned the EBS process by attending the EBS Prospect Course (48 students in 1999). In 1998, the Center received a second Hammer Award for developing and promoting CADD/GIS Standards for data content and format, recommending CADD/GIS policy, facilitating government and private sector cooperation, and centralizing CADD/GIS acquisitions.

In 1999, Release 1.9 of the Spatial Data Standards (SDS) included the first incorporation of the Facility Management Standards (FMS) into the standard, a major milestone in the Center's development of SDS for GIS implementations. Release 2.0 is planned this fall and will be termed the Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE). Also in 1999, the much-anticipated A/E/C CADD Standard Release 1.8 was distributed, and implementation tools to assist the user in conforming to the standard have been developed through the Center.

The Center's collaboration with businesses and other government agencies has advanced standardization of objects under the International Alliance for Interoperability (IAI). The Center's involvement in this process enables us to promote standard operations and data that are necessary for Federal government processes. A Center staff member chairs the Facilities Management Domain Committee, and an Engineer Research and Development Center (ERDC) staff member from Champaign, IL, chairs the Project Management Domain Committee.

As part of its technology transfer effort, the Center has offered numerous training opportunities. In addition to the students who took the EBS Prospect Course in 1999, 112 attendees took advantage of other Center instruction (85 on SDS implementation and 37 on the CADD Workspace).

The achievements in all Center projects are too numerous to enumerate, but some should not go unacknowledged. These include:

► Publication of the "Soil Erosion Model Guide for Military Lands: Analysis of Erosion Models for Natural and Cultural Resources Applications" on the Center's Web site.

► The desktop and Web-enabled Survey Engineering and Monument Management System (SEMMS), a utility software that provides for horizontal and vertical survey control data, retrieval, and maintenance and promotes consistency among various offices within the agencies in the management and dissemination of survey control data. It also contains all the existing National Geodetic Survey control data for the entire United States and territories.

► Web accessibility of the Library of CADD Designs, developed to make information on completed design projects available to all designers as a jump-start for related new projects.

► Development of the CADD/GIS Project Registry Clearinghouse, a database to help users find existing projects that may aid them in the development of their own related projects. The database can be queried, or project information and new projects can be added from the Clearinghouse Web site.

► Development of the "Civil/Site Solutions Manual" by the Corps' Field Action CADD (FAC) Group to document design methods for common civil/site layout problems, using the most common civil design programs in the Corps community, also available on the Web.

► Release 2.0 of the CADD Details Library, which continues the Center's tradition of providing generic construction details to design personnel as well as offering metric improvements over the previous product.

CADD Details Library Release 2.0 Now Available

by Stephen Spangler, The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment

In December 1999, the CADD/GIS Technology Center began shipping copies of the CADD Details Library Release 2.0 CD-ROM. This highly anticipated CD continues the Center's effort to provide generic construction details in CADD format to users. In addition to improvements in details from Release 1.0, this CD contains several new disciplines, including Interior Design, Landscape Architecture, Telecommunications, Civil/Site, and Structural. All details on the CD are included in both AutoCAD's .dwg and MicroStation's .dgn formats.

Other additions and improvements have been incorporated into the Release 2.0 CD. An installation routine has been added to assist in ensuring that the CADD detail manager is installed properly. Details can now be found by disciplines, and all detail reports containing information on detail creation and images of all details are stored in PDF format on the CD.

A copy of the CD can be requested at http://tsc.wes.army.mil/products/cadd details/, or by e-mailing Stephen Spangler at spangls@wes.army.mil.
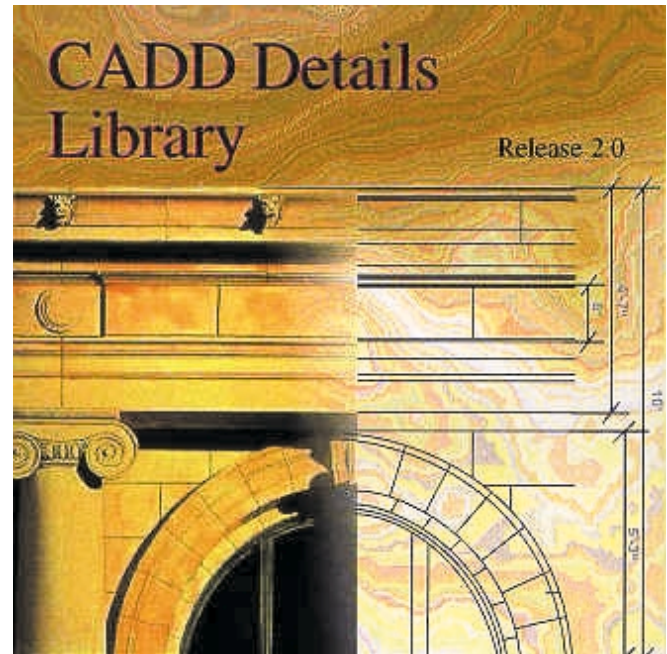
("From the Chief" continued)

► Development of a tool that replaces the typical MicroStation file manager as an aid to the user in creating file names based on the architectural/ engineering/construction (A/E/C) CADD standard file-naming convention.

► Initiated development of a standardized software suite in a Windows environment that integrates and enhances existing tools for aerial photo flight planning and aerial photo collection and management, and supports research and outreach efforts within the Department of Defense (DoD).

► Development of InRoads preference sets by the Corps' FAC Group conforming to the CADD standard and allowing users in the civil/site discipline to easily use standards without the tedious task of setup or user intervention during a work session.

► Preliminary automation of U.S. Geological Society (USGS) digital data into the SDS by developing and documenting methods for creating SDS-compliant data from USGS Digital Line Graphs (DLG) files.

► Finalization of the Spatial Data Transfer Standards (SDTS) Part 7: CADD Profile. The CADD profile allows the transfer of two- and three-dimensional geographic vector (spatial) data among CADD packages using the SDTS.

► Technical improvements to the Installations Management/Facilities CAD2 (IM/FCAD2) contract to provide customers with a one-stop shopping place.

While we take pride in our accomplishments, now is not a time "to rest on our laurels." We have moved into the new century with confidence, intent on fulfilling the Center's mission. We should and will continue to seek innovative solutions, strengthen our capabilities, and provide leadership to the CADD/GIS/FMS community at large. We solicit your help in fulfilling our mission to make you more productive through the use of technology. I invite each and every one of you to attend the CADD/GIS Technology Symposium 2000 on May 23-25 in St. Louis, MO, and see first hand what amazing technology is available to you.

Marines Convene at the CADD/GIS Technology Center

by Laurel Gorman,
The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment

The CADD/GIS Technology Center hosted the Marine Corps Geospatial Information Systems Users Group (MCGUG) meeting on February 3, 2000. Some of the Marine GIS users took advantage of the Center's Spatial Data Standards (SDS) training class held earlier in the week (January 31-February 2). Twelve Marine Corps representatives from the United States and Japan attended the Center training course and received instruction on the SDS data model structure, browser, and the toolbox. The students shared their experiences on implementing the SDS and GIS technology at their respective installations.

The MCGUG convened February 3 to exchange information, promote and sustain the use of GIS for integrated installation management, and assist in the development of policy for dissemination by Installations and Logistics, Headquarters, United States Marine Corps (HQMC). Ms. Lynn Phillips from Marine Corps Base, Camp Lejeune, and Mr. Kip Otis-Diehl from Marine Corps Air Combat Command, 29 Palms, co-chaired the meeting. Since 1999, the Marines have been recognized as a separate organization by the CADD/GIS Technology Center with sitting members on the Board of Directors, the Corporate Staff, and the Field User Groups. The Marine GIS attendees received a detailed overview of Center activities from Mr. Harold Smith, Chief; Architectural/Engineering/Construction (A/E/C)

CADD standards; the Center's Web site; and a tour of the Information Technology Center's Joint Computer Facilities.

During the user group meeting, key topics were discussed and acted on including:

➤ MCGUG Charter and By-Laws.
➤ MCGUG Web site.
➤ Marine participation in Center groups and projects.
➤ Marine participation for the CADD/GIS Technology Symposium 2000.

Concurrently, the MCGUG and the HQMC GIS Policy Working Group are working hard to maximize the available GIS resources and share lessons learned. The group has drafted the GIS Guidance Document, a key accomplishment, to assist all Marine Corps installations in developing an integrated GIS to manage their respective assets and reporting requirements. With HQMC endorsement, the forthcoming Guidance report will provide a cohesive GIS policy and solutions for Marine installation management. Further refinement will be presented at the next meeting scheduled for June 22-23, 2000, at Marine Corps Base, Camp Pendleton, CA. For further information about the MCGUG, please contact Ms. Lynn Phillips at phillipsml@lejeune.usmc.mil or Mr. Kip Otis-Diehl at otisdiehlpk@29palms.usmc.mil.

Streamlining the Bidding Process

by Drew L. Anderson and Elias Arredondo, The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment; and Lee Byrne, Information Technology Laboratory

In keeping with the U.S. Army Corps of Engineers' (USACE's) movement toward paperless offices, the Electronic Bid Solicitation (EBS) program makes possible the electronic transfer of contract bids and eliminates unnecessary reproduction and storage of printed material. Prospective bidders can view, search, download, and request project solicitation documents via the Internet. The only requirements are a Windows-based PC and an Internet browser. This streamlined procurement system has resulted in significant savings in resources.

In 1996, LTG Joe N. Ballard, Chief of Engineers, presented the prestigious Vice President's Hammer Award to the EBS Working Group for formulating, developing, and testing the EBS program through pilot projects. Recent enhancements to the EBS have increased the program's serviceability. These include a standardized Web site design for better navigation, development of an MS Word macro for printing mailing labels, Version 4.0 of AcroBld, and integration of EBS and the Army Single Face to Industry (ASFI).

New Web Site Design

The hub for all EBS sites is the Tri-Service Solicitation Network (TSN) (http://tsn.wes.army.mil), established at the CADD/GIS Technology Center. Recent changes to the TSN Home Page use an updated interface and make the site more user friendly. All EBS Web sites will soon have a standardized appearance and functionality.

Additional enhancements will enable contractors to log into one location and move around freely between different Districts. Files can be transferred via FTP in addition to HTTP, making it easier for the user to download multiple files with fewer keystrokes and eliminating the necessity of creating zipped files. Other improved features include:

- ► Expanded search capabilities.
- ► Ability to download information in eXtensible Markup Language (XML) format, making customized searches possible.
- ► Increased communication capability between local and central Web sites, allowing automatic posting of information.

- ► Capability of e-mailing amendments to solicitations.
- ► Formation of Regional Business Centers.
- ► Automatic posting to ASFI.

MS Word Macro for EBS Labels/Fax Numbers

A useful feature of the EBS Web site is the availability of an MS Word 97 macro to create mailing labels and retrieve fax numbers. The EBS Labels/Fax Numbers template installs as a Word Add-In and places buttons on the user's tool bar for easy activation. Setup involves the following steps:

- ► Users access the TSN Web site and select their Web site from the list (Figure 1).
- ► A list of advertised solicitations is displayed.
- ► Once a solicitation is selected, the macro creates a document of Avery labels and populates it with Plan Holders for that solicitation (Figure 2).
- ► If a user name and password is given, the user can mark the Plan Holders as being mailed.

The user's Web site administrator must install a script and register with TSN.

Figure 1. Screen shot of list of registered EBS Web sites
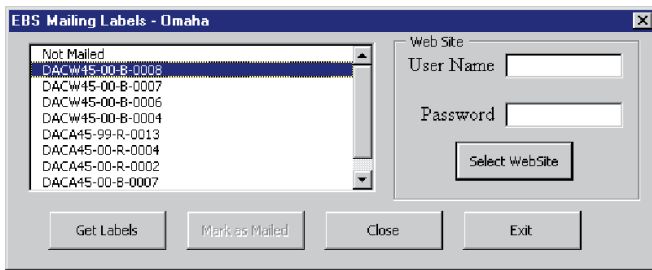
Figure 2. Screen shot of EBS mailing labels

AcroBld Version 4.0

AcroBld is a program written by the EBS Working Group to combine multiple Portable Document Files (PDF) into one file using a text file, which states how the files are to be organized. A bookmark tree is created at the same time, enabling a user to move from section to section with just a click of the mouse. The resulting document is then saved, sitting it so that the bookmarks will be shown when the file is opened. AcroBld Version 4.0 will be out later this year and will include the following enhanced features:

► A Graphic User Interface (GUI) interface for structuring documents.

► The ability to read SpecsIntact Standard Generalized Markup Language (SGML) files, adding them to the user's file structure.

► Removal of a limitation requiring that each level must start with a file.

► Backwards compatibility that allows previous BLD files to be read.

The software requires that Acrobat Exchange be installed and is compatible with Versions 3.x and 4.x.

Army Single Face to Industry

The Army Single Face to Industry (ASFI) is an automated process created by the Army Materiel Command (AMC) that extracts information from an Electronic Data Interchange (EDI) document produced in the Standard Procurement System (SPS), displays it on a Web site, and makes it searchable from a central site. Solicitations marked for EDI are copied to the site's Web server, where scripts interpret the data, creating a Web document. Metadata is sent to the central site, where it is loaded into a database. Contractors are then able to contact the central site, perform a search, and find solicitations they are interested in over a wide range of agencies.

The CADD/GIS Technology Center is working with AMC to create an Extensible Markup Language (XML) structure that is capable of transferring solicitation information in an easy to read format. The resulting scripts will create the XML document, placing it on the local Web server and forwarding a copy to ASFI. The information can then be loaded into a database at both places, allowing for searches to be performed in either location. This redundancy lessens downtime in case either the local or central site has a failure.

To aid sites in working with the XML documents, the scripts will come with the following documentation.

► A document defining the tags in the XML document.

► A Microsoft Access database, able to store the information contained in the XML document and with necessary lookup tables, already populated.

► A Java program that will load an XML document into the Access database via Open Database Connectivity (ODBC).

► An XML document that contains all lookup information.

► An Active Server Pages (ASP) file that will display the solicitation on Microsoft's Information Internet Server 4.0 Web site.

This information is not only pertinent to government agencies, but also to the contracting community. Businesses will have the capability to do a simple query of solicitations, receiving an XML document. The information can then be loaded into the users' own database and processed as they see fit, enabling them to do more exact searches. Searches will become automatic, hitting the Web site with standard queries, loading the resulting XML document into a local database, and then performing the search, resulting in a list of solicitations of interest to the contractor. This process alleviates a user's having to navigate from Web page to Web page, searching manually.

It is hoped that by moving to an XML format, the ability to exchange information around the Department of Defense (DoD) as well as with the contracting community will be seamless, enabling a constant flow of information, easing the job of contractors in finding a desired solicitation, and giving DoD a better product from increased competition.

For additional information, contact Drew Anderson at 601-634-4226 or andersd@wes.army.mil or Elias Arredondo at 601-634-3140 or arredoe@wes.army.mil.

NAVFAC Geospatial Policy

by Dick Bilden, Naval Facilities Engineering Command

*The following has been extracted and edited from an article published in the November 1999 issue of the "**U.S. Air Force GeoBase Forum**," written by LtCol Brian Cullis, U.S. Air Force Institute for Information Technology Applications.*

Headquarters, Naval Facilities Engineering Command (NAVFAC), held a CADD/GIS Policy Workshop October 26-28, 1999, at the Washington Navy Yard. Objectives of the meeting included:

➤ Development of an overall strategy leading to comprehensive Navy policy in coordination with the efforts of the other services.

➤ Identification and resolution of issues associated with implementing CADD, GIS, and related electronic tools.

➤ Development and formulation of interim guidelines.

➤ Finalization of NAVFAC mapping guidelines for distribution.

➤ Development of a concept of operations including education and teaming for delivery of services.

➤ Development of a plan of action and milestones for follow-on actions, with the ultimate goal of developing a strategy that will lead to a comprehensive Navy policy fully coordinated with the other services.

The workshop was attended by a large cross section of field representatives as well as strong representation from the office of the NAVFAC Chief Information Officer. Also included were representatives from the CADD/GIS Technology Center for Facilities, Infrastructure, and Environment; U.S. Marine Corps; U.S. Air Force; U.S. Army Corps of Engineers, and Installation Management/Facilities CAD2 (IM/FCAD2) vendors. Positive discussions were held on how to ensure close coordination with the CADD/GIS Technology Center in developing a final version of the NAVFAC Guidelines for Installation Mapping and Geospatial Data, and how to ensure compliance with Federal Geographic Data Committee (FGDC) metadata, and National Spatial Data Infrastructure (NSDI).

There were numerous presentations. Mr. Ayman El-Swaify, the CADD/GIS Manager from the Navy Public Work Center (PWC) Yokosuka (elswaifya@pwcyoko.navy.mil) shared the excellent work being performed in the Japan region with his briefing entitled "CADD/GIS Implementation by the U.S. Navy, Japan Region." A great example of collapsing contiguous GIS programs in Hawaii into a single, integrated regional architecture was demonstrated in a briefing entitled "Regional Shore Installation Management System" presented by Mr. Paul Pollock, PWC Pearl (pollockpa@plwcpearl.navy.mil). Mr. Bobby Bean shared the current status of the enterprise-wide investment in geospatial information technology (IT) at Naval Air Station (NAS) Patuxent River, MD (beanra@navair.navy.mil). Finally, Mr. Maurice Wilber (mwilber@erols.com), a nationally recognized cost/benefit expert from MCA Research Corporation, shared his fiscal analysis of returns on IT investments from the NAS Patuxent River.

Of significant note, the NAVFAC CADD/GIS policy draft developed during the workshop adopted several of the GeoBase Foundations agreed upon at the August 1999 USAF GeoBase Policy Workshop held in San Antonio, TX. Their inclusion in both the draft policy guidelines and the Interim Policy Guidance for CADD, GIS, and Related Technologies that was subsequently published by NAVFAC in December 1999 demonstrated their universal relevance and applicability to other DoD service components.

The NAVFAC Interim Policy Guidance for CADD, GIS, and Related Technologies is available on the Center Web site at http://tsc.wes.army.mil. Additional information on the USAF GeoBase Initiative can be obtained from LtCol Brian Cullis at the U.S. Air Force Institute for Information Technology Applications, 719-333-7978 or brian.cullis@usafa.af.mil.

Natural and Cultural Resources Forum

by Laurel Gorman,
The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment

Welcome to the Natural and Cultural Resources Forum, a column dedicated to GIS issues and information for natural and cultural resources management. Because of Federal compliance regulations and laws, natural and cultural resources play a vital role in supporting the mission of military installations, Civil Works projects, and other related Federal agencies. This column will highlight these key activities championed by the Natural and Cultural Resources Field User Group (FUG) (formerly the Field Working Group) and provide a forum for discussion of natural and cultural resource issues with GIS. This issue's column focuses on the CADD/GIS Technology Symposium and FUG-related projects.

Symposium Plans

The Natural and Cultural Resources FUG has planned several activities to promote natural and cultural resource issues including a technical session, displays in the Center's booth, and group meetings. On Tuesday afternoon, May 23, 2000, members of the FUG will host the Natural and Cultural Resources technical session. The lead presentation will be an overview of the Natural and Cultural Resources FUG activities followed by talks on the regional Mojave Desert Ecosystem Program and decision- support tools in the Land Management System (LMS). Reports developed by the FUG, Web demos and PowerPoint presentations will be displayed in the CADD/GIS Technology Center's booth. Members of the Natural and Cultural Resources FUG will be available during exhibition hours in the Center booth. We look forward to exchanging ideas and solutions for natural and cultural resources management with you during the Symposium.

Standards Watch

The cultural resources FUG members are continuing to tackle the reorganization and expansion for the Cultural Entity Sets in the Spatial Data Standards (formerly called the Tri-Service Spatial Data Standards). Restructuring of the Cultural geospatial features and their attributes will support National Environmental Policy Act and Archaeological Resources Protection Act GIS applications. The latest copy of the proposed standard can be viewed from the FUG's Home Page at http://tsc.wes. army.mil/contacts/groups/FWG/ Natural-Cultural/.

FUG Meetings

Dr. Paul Green, member from HQ Air Combat Command, hosted the last FUG meeting during February 16-17, 2000. The focus of the meeting was on this year's project, Digital Photogrammetry Recordation Standards, which will identify stand-recordation of geospatial features such as rock art and other micro-scale resources with greater accuracy and automation utilizing the latest technologies. Other meeting topics included the proposed FY01 project, revising the Cultural Spatial Data Standards, discussing the latest GIS applications for natural and cultural resources management, and reporting the status of sensitive species standards. For further details, view the meeting minutes at http://tsc.wes.army.mil/contacts/ groups/FWG/ Natural-Cultural/meetings/Feb00min.html.

Field User's Input

On behalf of the Natural and Cultural Resources FUG, I invite you to contribute articles or comments to Laurel Gorman at gormanl@wes.army.mil or 601-634-4484.

Survey Engineering Monument Management System (SEMMS)

by Dr. V. Danushkodi, The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment

The CADD/GIS Technology Center has developed a SEMMS software package that allows users to store, retrieve, manage, view, and distribute both horizontal and vertical survey control information on a stand-alone desktop PC and through the Internet. The Center and the U.S. Army Topographic Engineering Center developed the desktop version with the assistance of a task group consisting of field representatives. It uses a survey control database schema and common data fields associated with the Center's Spatial Data Standards. Figure 1 shows the major functions of the desktop SEMMS software.

The Add Control Points menu provides options to enter data for new monuments or to import existing digital data in various formats, such as ASCII, Excel, Dbase, ACCESS, and compressed files of National Geodetic Survey (NGS) data. Control Point data can be searched from the database over a rectangular area, a circular area, and a quad map or by search criteria specified by the user. SEMMS incorporates the Corps of Engineers' coordinate conversion routines (CORPSCON), and the search results can be displayed and printed in any combination of datums, such as North American Datum (NAD) 27 or NAD 83, and Projections, such as Universal Transverse Mercator (UTM) or State Plane Coordinate System (SPCS).

The Web-Enabled SEMMS provides both internal and public access to the monument database through the Internet. This software provides users with graphical and text only search options. In the graphical search, the user first selects a state and then a quad map within the selected state for a data search. All monuments appear on a digital image of the selected quad map. A tool tip showing the name of the data point appears when the user moves the mouse over any data point. All information from the database is listed when the user clicks on any data point. The user can also click and drag a rectangle to retrieve information about a group of data points. Figure 2 shows all monuments in a Tennessee quad map.
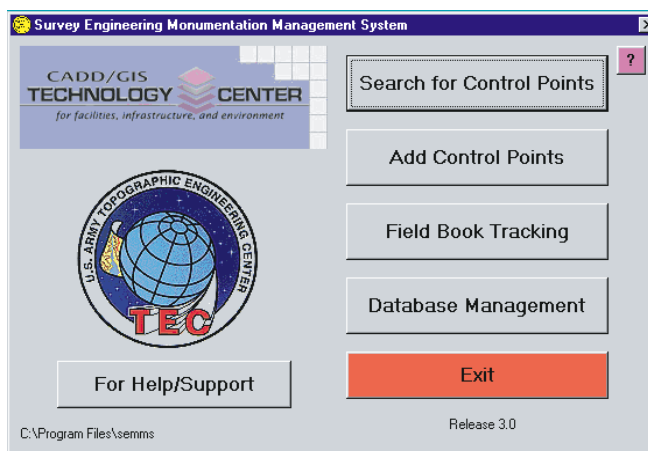

Figure 1. Major functions of the desktop SEMMS software

Several options such as search by monument name, search within a rectangular box or within a circular area, and search by a quad name are available if the user selects the text-only option. A summary of the selected data is listed in a table. The user can list information for any desired data point or all selected points. Figure 3 shows a summary table and details listing all points from a Tennessee quad.
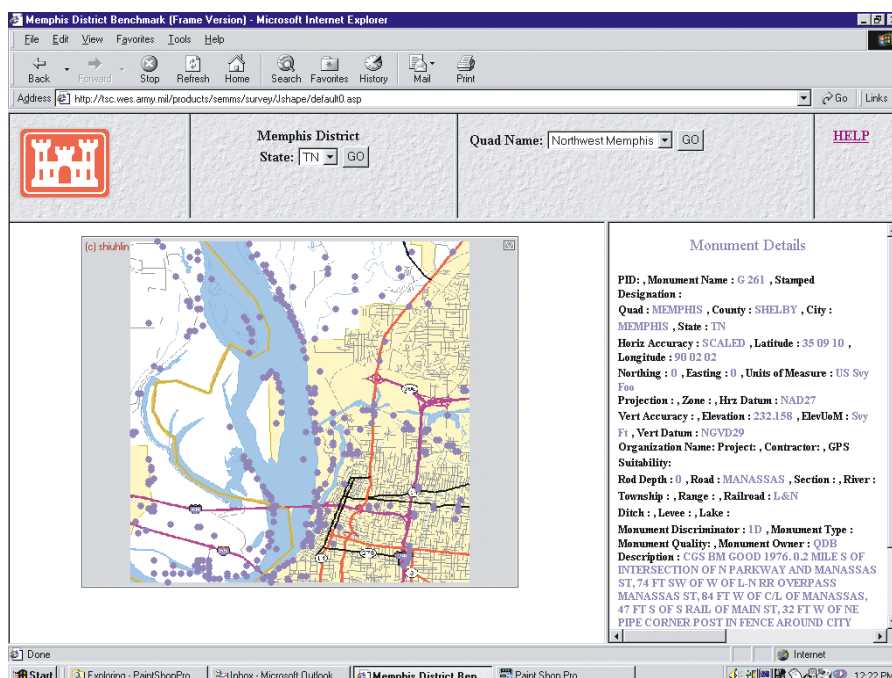

Figure 2. All monuments in a Tennessee quad map

The Center developed the Web-Enabled SEMMS software in Active Server Pages (ASP). It uses a customized public domain Java applet. Digital images of quad maps were generated from Tiger Mapping Service and stored on disk. The Web- enabled software is available for installation at any office with servers using ASP. This software can be tested at http://tsc.wes.army.mil/products/semms/survey/mvmsemms/.

The desktop version of SEMMS and compressed NGS data for all states and territories of the United States can be downloaded from http://tsc.wes.army.mil/products/semms/semms.htm. The Center is available to assist any users with onsite implementation of the stand-alone and/or the Web-based version of SEMMS. For additional information, contact Dr. Danushkodi at 601-634-4452 or e-mail to danushv@wes.army.mil.
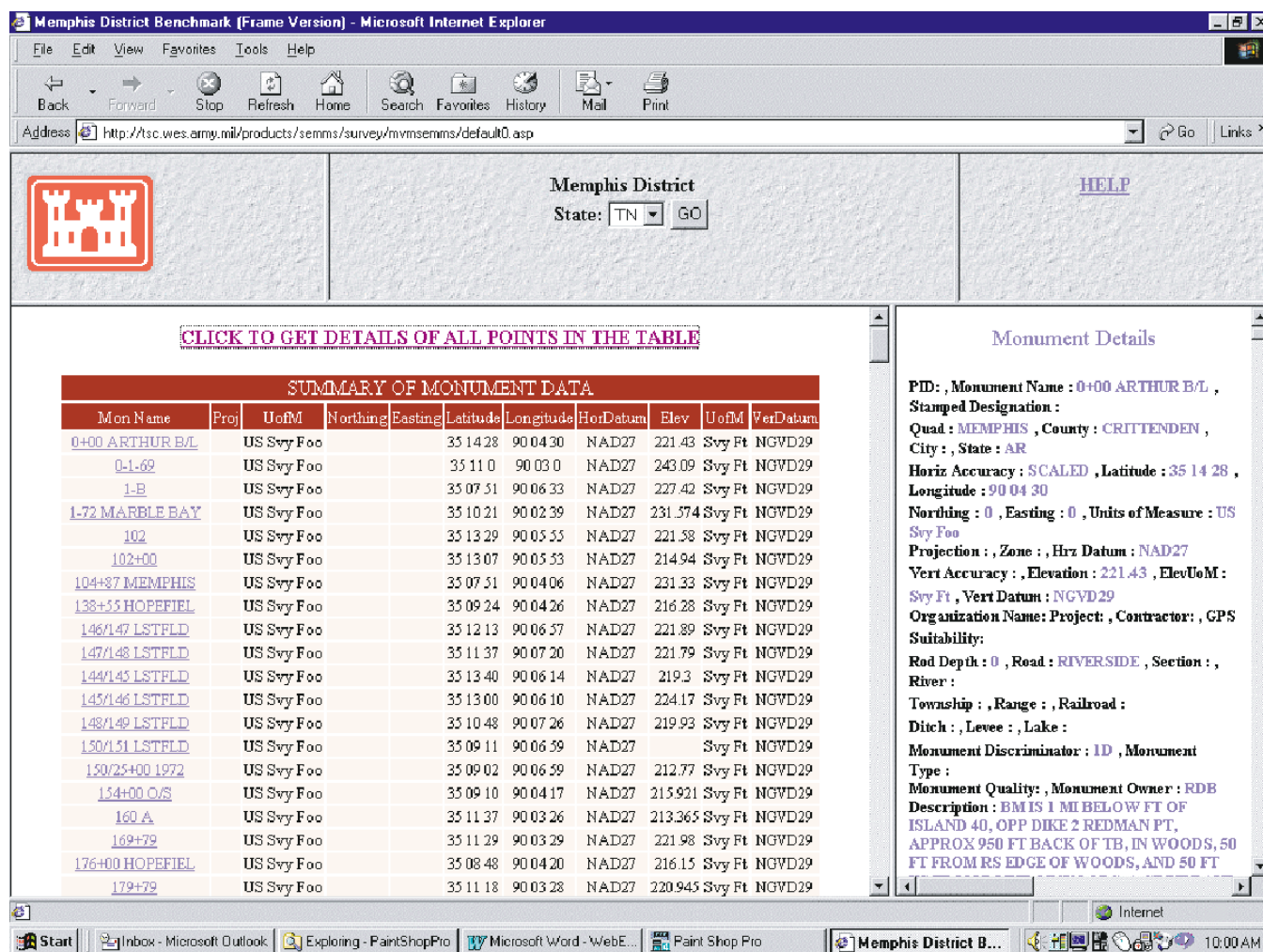

Figure 3. Summary and details of all points from a Tennessee quad

Techniques for Conversion of REEGIS to SDS

by Nancy Towne, The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment,
and Lee Byrne, Information Technology Laboratory

The CADD/GIS Technology Center is currently converting the Mississippi Valley Division (MVD) Regional Engineering and Environmental Geospatial Information System (REEGIS) databases to the Spatial Data Standards (SDS). This project supports the MVD's commitment to standardization of the Corps' comprehensive geospatial database for the Mississippi River and its tributaries within MVD. Conversions of databases and graphics have been successfully completed for the Atchafalaya Basin and Vicksburg District, and the Center is currently con-

verting the remaining MVD REEGIS databases. The initial mapping of the Atchafalaya and Vicksburg projects was done in SDS Release 1.8 and continued in SDS Release 1.9.

Conversion Process

Several conversion translator software tools have been created to enable this process to flow smoother and faster. The conversion process consists of three major parts:

► **Creation of a conversion report.** This report consists of a detailed description of all conversions that are done and problems that are encountered.

► **Creation of an SDS-compliant database.** An SDS-compliant database consistent with the source data is created. Errors or inconsistencies in the original database are documented, and inconsistent data are not converted. All system tables are corrected, and linkages of the user tables to the graphics are maintained.

► **Conversion of all linkages in graphic files.** All original and modified graphic files remain. The database linkages in the graphic files are modified to reference the correct tables and attributes.

Software components for the SDS conversion process include Intergraph MGE/MicroStation, Intergraph Relational Interface System (RIS), and Oracle Relational Database. During the process, every category and feature is converted to the corresponding SDS entity set, entity type, and entity class (e.g., 69 features for the Atchafalaya). This is a major change cascading down to all the attributes, domain tables, and domain values. All design files are modified using SDS naming conventions and validation rules. This modification impacts all REEGIS applications and any customized tools.

Photo courtesy of Anne Marino, New Orleans District

With the implementation of the Regional Engineering and Environmental Geospatial Information System (REEGIS) in August 1993, the Mississippi Valley Division (MVD) and its District offices reached a long-anticipated milestone initiated in 1992. This massive geospatial database for the Mississippi River and its tributaries within the MVD contains digitized information going back to the 1880s and includes both tabular data and graphics. By consolidating engineering and environmental facts about the Mississippi River system into a standardized geospatial format, REEGIS has been an invaluable resource for project engineers and scientists who are responsible for design engineering and construction of navigation and flood-control projects and environmental, geomorphologic, and hydrological investigations. The REEGIS Data Dictionary, Version 4.0, defines the data standards and includes over 260 graphic features and 240 relational database management system tables and maps extending over 1,150 miles of the Mississippi River and 180 miles of the Atchafalaya River. The database is available to all Corps of Engineers' offices.

For additional information, visit the REEGIS Web site at http://www.mvd.usace.army.mil/reegis/reegis.htm or contact Stephen P. Cobb, Geospatial Data Coordinator, U.S. Army Corps of Engineers, Mississippi Valley Division, P.O. Box 80, Vicksburg, MS 39180; e-mail: cobbs@smtp.lmvd.usace.army.mil.

Reference: "Mapping the Mississippi River," by Stephen P. Cobb, September 1998, Geoworld, http://www.geoplace.com/gw/1998/0998/998map.asp/.

Some of the concerns associated with the conversion process are:

► One to many and many to one splits in the database tables (where do all the REEGIS attributes fit?).

► Design files' Data Management Retrieval System (DMRS) linkages (all design file names and contents will change, so how does the user determine where each feature will go?).

The technique used in the conversion involves building a database "shell" using the REEGIS filter,

creating custom productivity tools to assist in the conversion process (Microstation user commands to change DMRS linkages, Visual Basic checker tools to validate the quality of the database, and ACCESS queries to translate the database) and separation of the process into two parts, attribution and graphics. The conversion process (1) determines the tables and attributes that contain data (these are the only ones that are converted) and (2) verifies all features and design file usage by means of a custom checker tool. The procedure also (1) determines the design files that need to be converted using a custom application, (2) moves all graphic features to the correct SDS design file (the level and symbology such as color, line style, and weight are changed, but cells are not changed), and (3) updates the DMRS linkages in all design files (the user tables' mslink values are maintained).

During the conversion process, all categories and features are changed. Regarding the Atchafalaya project, the original 12 categories and 69 features are converted to 12 SDS-compliant categories and 60 features. An example of the SDS-compliant Atchafalaya Basin Project can be seen in Figure 1. All design filenames are changed to reflect the SDS naming conventions. Impacts on applications of the database (to the original project data) include reference files, navigation chart creation, survey management, channel improvement and data reports (dike and data book).

Reports of the conversion process are created and include documentation of the conversion process and all quality control procedures. The documentations for the Atchafalaya and Vicksburg projects were delivered to the appropriate MVD District office along
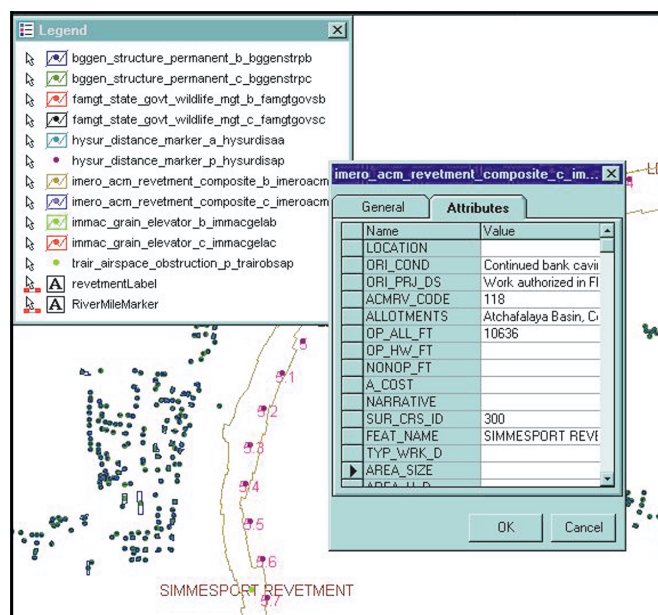
Photo courtesy of Arthur Belala, New Orleans District

The Atchafalaya Basin, located in southcentral Louisiana, provides a valuable habitat to fish and wildlife, and over half of the birds that migrate into North America use this area each year. By a 1996 Memorandum of Understanding, the Corps of Engineers and State of Louisiana jointly manage and maintain these fish and wildlife resources, ensuring public access for traditional recreational uses such as crawfishing, hunting, and fishing, while protecting the natural environment. In 1999, the New Orleans District completed the overall Atchafalaya Basin Mapping Project. The result is the Atchafalaya Basin GIS (utilizing the REEGIS schema) plus four cartographic products, for a total of nearly 750 map sheets. For additional information about the Atchafalaya Basin Mapping Project, visit the New Orleans District Web site at http://www.mvn.usace.army.mil/atchafalaya/default.htm or contact Ralph Scheid at 504-862-2995; e-mail: Ralph.A.Scheid@MVN02.usace.army.mil.

with the SDS-compliant project, including database tables and design files.

A thorough knowledge of the SDS is a "must" in the conversion process, and correct, clean original data (both database and graphics) enable the conversion to go more smoothly.

"The data conversion support provided by the CADD/GIS Technology Center positions the District to be more compliant with data standards and to gain the advantages therein. We have found the conversion of REEGIS to the Spatial Data Standards to be seamless and useful. SDS-compliant GIS data sets will be the basis of the 'Enterprise GIS' being planned at our District," says Ralph Scheid, New Orleans District.

Scheid also states, "Production of electronic charting data sets (S-57) is a goal. Again use of standard data format provided by SDS gives us a basis for software development."

The conversion of REEGIS to SDS allows easy accessibility and exchange of data within the Districts and Divisions and throughout the Corps of Engineers.

For additional information, contact Nancy Towne at 601-634-3181 or e-mail to townen@wes.army.mil.

Figure 1. Intergraph GeoMedia Map Window of Atchafalaya Basin Project

Mapping DLA's Defense Supply Center in Columbus, Ohio

by Milton Richardson, The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment, and Lee Byrne, Information Technology Laboratory

When the U.S. Army Quartermaster Corps purchased 281 acres of swamp and farmland in Columbus, Ohio, in 1918 to construct six warehouses for storage, few realized these same buildings would still be in use in the year 2000. During World War I, transportation of men and materials was a critical issue. The Columbus location served as a much needed access point to three major railroad lines. In 1942, with World War II in its infancy, the facility was enlarged by another 295 acres and became the largest military supply installation in the world, employing over 10,000 civilians. At this time, some of the warehouses were converted to barracks to house prisoners of war. After the war, the facility continued its operation as a supply center for the military.

Now after 82 years, 14 name changes, and numerous modifications to the infrastructure, the installation houses the Defense Supply Center Columbus (DSCC) of the Defense Logistics Agency (DLA) and continues a tradition of tending to the needs of the U.S. military worldwide.

In 1998, in response to expansions, mergers, and changing missions, the DSCC sought innovative ways to streamline its processes and help it realize its vision to "build a foundation for greater things to come." With this as its motivation, DSCC tasked the CADD/GIS Technology Center with development of a site-specific tool, complete with mapping and querying capabilities, that would allow immediate access to multiple databases containing details about the facility. The program would make use of
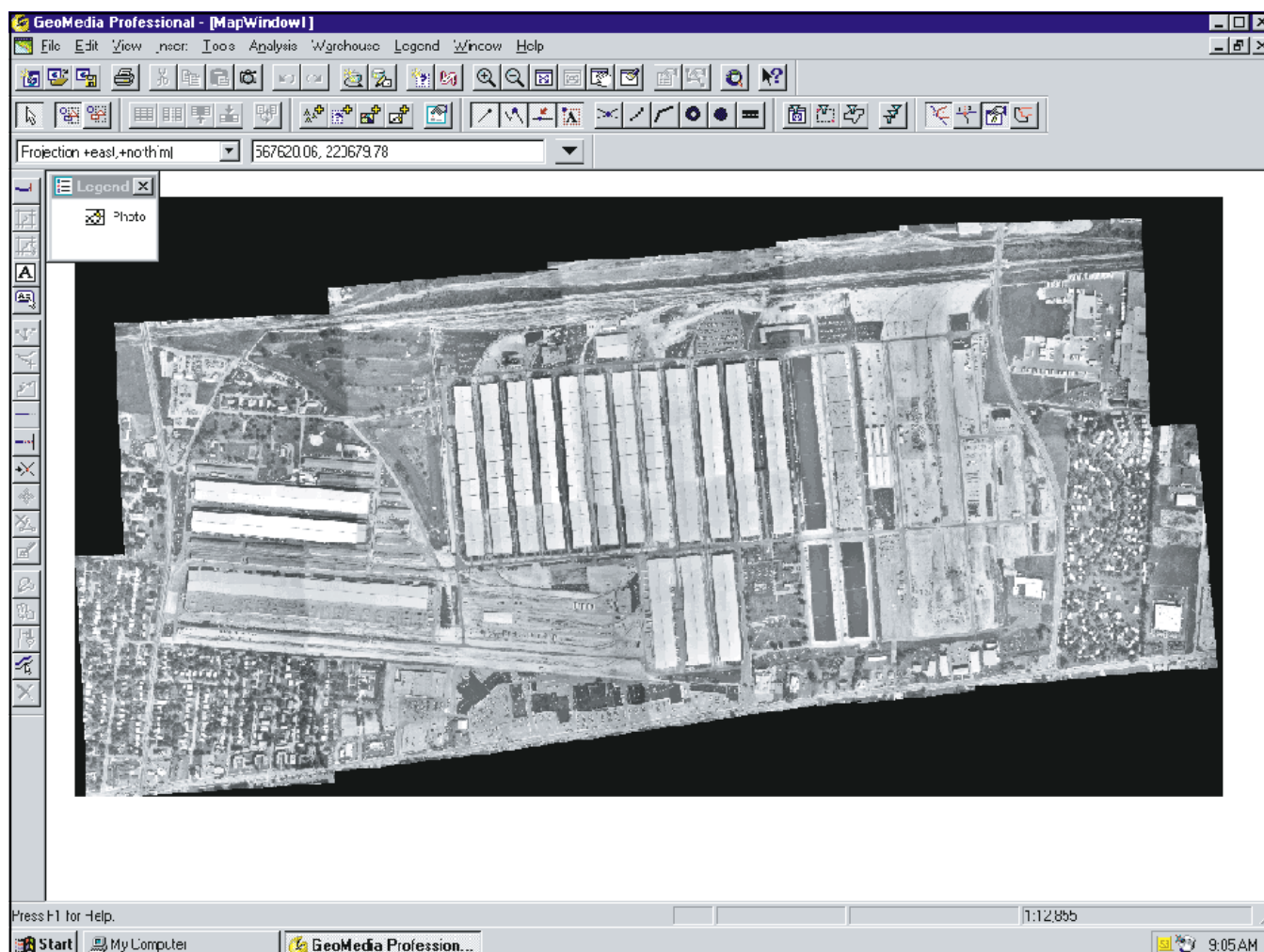

Figure 1. Aerial photograph of DSCC site

existing databases (to avoid duplication of efforts) and would allow communication across databases and between DLA Headquarters and DLA sites.

Armed with 20 black-and-white aerial photographs taken in the early 1990s (Figure 1) and one AutoCAD file containing CADD drawings of the infrastructure (Figure 2), the Center team in collaboration with DSCC has developed an application that provides:

➤ Visual imagery of the physical layout of the DSCC infrastructure, including streets, buildings; footprints of previously existing constructions; water, gas, and sewer lines (Figures 3 and 4); manholes; sprinklers; fire hydrants; electric lines, etc.

➤ Present and historical data, readily available for comparison.

➤ Pull-down menus containing detailed specifications about a structure at the click of the mouse.

➤ Color-enhanced codes for easier identification of items.

➤ Ability to turn specific features on and off at the discretion of the user.

➤ Capability for the user to initiate queries (Figure 5).

➤ Built-in security system.

➤ Plotting/printing of maps and data files.

➤ Potential for further development and enhancement of the program and input to the databases.

After an initial assessment and determination of applicable software, the CADD team selected Geomedia Professionals for input and management. The first step was to mosaic the black and white photographs to create a composite image and warp this aerial map to state plane coordinates. The next step was to display the AutoCad drawing file in GeoMedia, overlay it on the mosaicked photo, and digitize the combined image to include additional features. The Spatial Data Standards (SDS) served as the database schema. By recycling existing databases, the project avoided the expense of and time spent in redoing information that was already available in a usable format. For the DSCC project, three databases are involved:

➤ A DLA project database (in Microsoft ACCESS) contains information about the buildings with their ID numbers. This database used the SDS as its schema.

➤ An Installation Facilities System (IFS) database (ORACLE), required by the Army for reporting functions, contains nongraphic information about the infrastructure, such as building numbers, square footage, design usage, current usage,
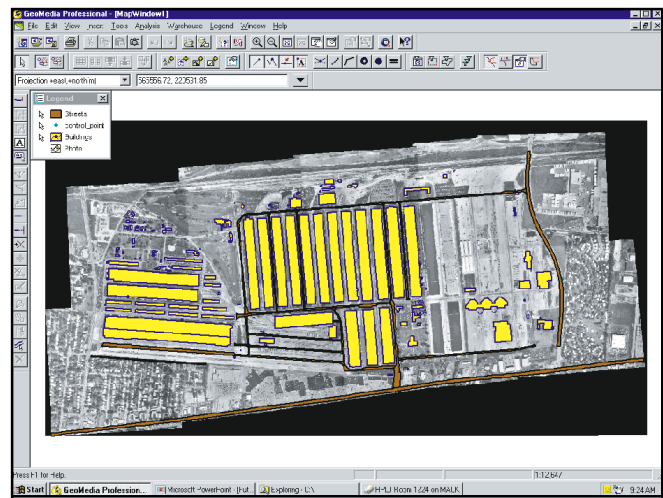

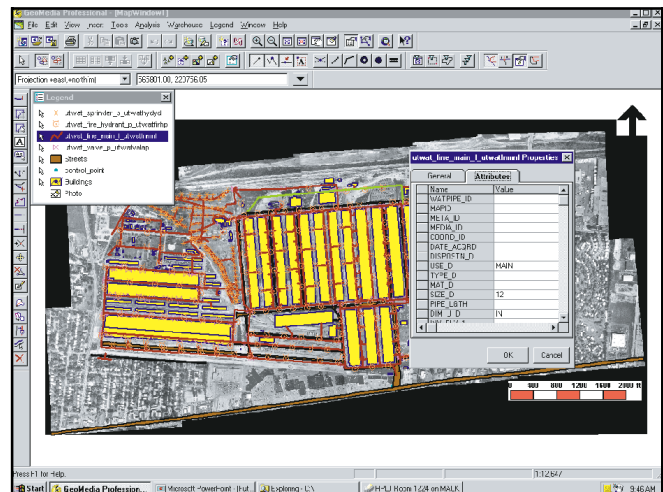**Figure 2. AutoCad drawing of DLA site**

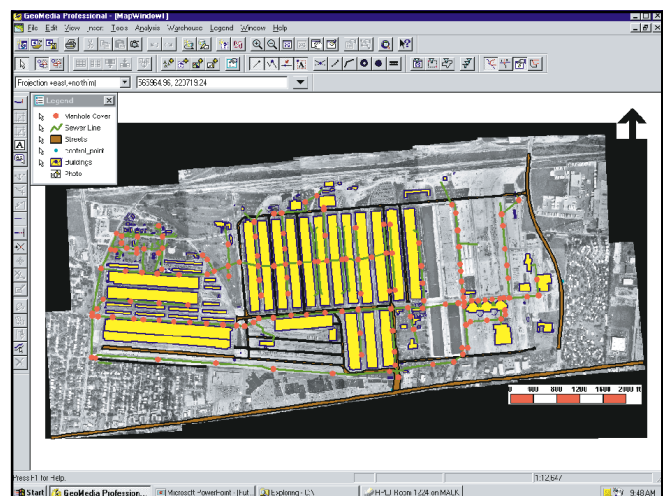**Figure 3. Water lines with valves and sprinklers**

Figure 4. Sewer lines with manhole covers

owner, tenant, and much other needed information to manage a site such as DLA Columbus.

➤ Another DLA database (in Microsoft ACCESS) contains site-specific information and includes things that do not correspond to the SDS. This traditional table, called "building usage," provides ID numbers.

The databases are accessed by Open DataBase Connectivity (ODBC) connection to the server. This connection allows the application software to access data from multiple databases. The project can be viewed via a viewing package provided by GeoMedia (probably the choice for the planner) or a Web browser (best for the occasional user). The individuals who maintain the database use GeoMedia Professional.

This type of application responds to the needs of a number of people in various positions of responsibilities: space planning, security, fire safety, inventory control, Headquarters reporting, facility management, or facility planning. For example, someone from the Planning Department, not necessarily a typical GIS user, might use existing CADD or GIS files or an IFS database to obtain drawings

and nongraphic information that depict current or future arrangements or spreadsheets that show quantities. Security personnel or guards at the entrance gates might use existing GIS data from Department of Public Works (DPW), IFS data attached to the GIS system, or routing software to develop maps to locations onsite, spreadsheets showing building contents, or lists identifying the locations of personnel. Personnel from the fire department, planners, or facility managers might use existing GIS and IFS databases or routing software for fire safety measurements. Inventory control specialists might use existing GIS systems joined with inventory databases to develop spreadsheets or maps itemizing information about bins and bin locations. Both Headquarters personnel and local management personnel can use existing GIS and joined data sets for graphic and nongraphic output for data calls. The application allows HQ personnel to do their own data calls and keep current information about the status of each site. DPW users and planners can access existing GIS and IFS databases and work orders to produce additional work orders, maps, spreadsheets, and permits. Facility planners and managers can tap GIS and IFS databases and CADD files to formulate planning documents.

From the Commander at Headquarters to the maintenance person who needs to know the location and dimensions of a buried water pipe, the DSCC GIS program offers a fast, efficient, and accurate way to obtain needed information. This project proves that it is never too late to look at the past in order to build a better future.

For additional information, contact Milton Richardson at richarm@wes.army.mil or 601-634-4580.
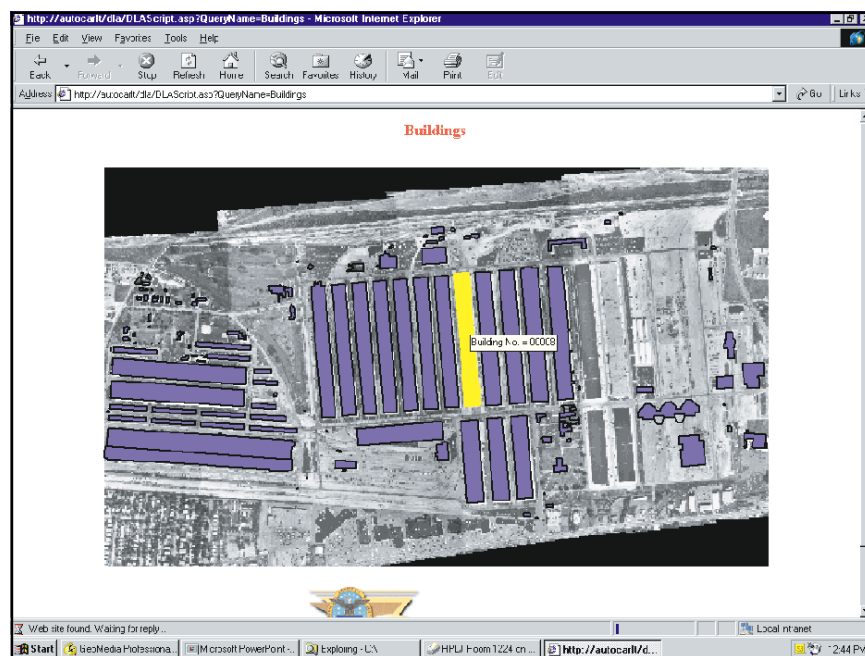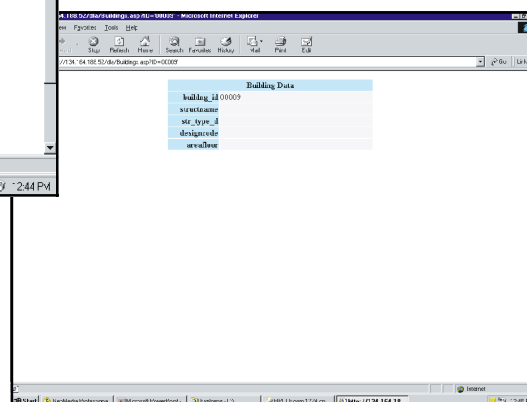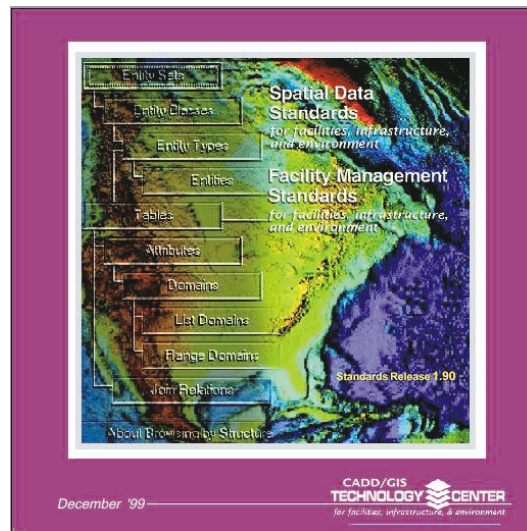

Figure 5. Querying capability

Spatial Data Standards (SDS) for Facilities, Infrastructure, and Environment and Facility Management Standards (FMS) for Facilities, Infrastructure, and Environment, Release 1.90

by Bobby Carpenter, The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment

December 1999 marked the completion of Release 1.90 of the Spatial Data Standards (SDS)[1] and Facility Management Standards (FMS) for Facilities, Infrastructure, and Environment.[2] The SDS/FMS Release 1.90 is available for download from The CADD/GIS Technology Center's Web Site (http://tsc.wes.army.mil) and on CD-ROM.

Release 1.90 highlights are as follow:

► Improvements to the SDS symbology, including:

  › Updates to the AutoCad, MicroStation, and ArcInfo symbol sets, which include coordination and uniformity between the SDS and architectural/engineering/construction (A/E/C) CADD Standards symbol sets.

  › Changes to the SDS colors and line styles to be consistent with the A/E/C CADD Standards.

  › Changes to ensure the "logical application" of color (e.g., water is blue, trees are green).

► Development of one new Entity Set entitled "Future Projects."

► Incorporation of "military range and training" and "USACE lake operations" related recommendations from technical group meetings.

► Incorporation of new tables and domain values related to environmental sampling and analysis from the Air Force Environmental Restoration Program Information Management System (ERPIMS).

► Incorporation of new Entity Types from the USACE Mississippi Valley Division's Regional Engineering and Environmental GIS (REEGIS).

► Development of a total of 4 new Entity Classes, 41 new SDS Entity Types, 52 new SDS/FMS Attribute Tables, and 83 new Domain Tables. The Entity Sets with new Entity Types include: Boundary (2), Cadastre (1), Communication (3), Cultural (2), Demographics (2), Environmental Hazards (1), Fauna (3), Flora (1), Future (3), Hydrography (1), Improvement (6), Military Operations (4), Transportation (3), and Utilities (4).

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[1] Formerly the Tri-Service Spatial Data Standards (TSSDS).

[2] Formerly the Tri-Service Facility Management Standards (TSFMS).
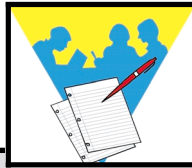
CADD/GIS Bulletin Survey

Special thanks to the tri-services and Corps of Engineers CADD/GIS users who participated in the *CADD/GIS Bulletin* survey. The survey is designed to assess the CADD/GIS professionals' awareness, adoption, and use of the on-line *CADD/GIS Bulletin*. Ms. Terri Prickett, employee of the Engineer Research and Development Center, Coastal and Hydraulics Laboratory, and graduate student from Colorado State University, conducted the telephone survey during March. The survey results will be published in the next *CADD/GIS Bulletin*.

FIRST CLASS